Claims

[1] 1. A Ziegler-Natta catalyst for olefin polymerization, which is produced by a method comprising a step of reacting a transition metal compound having a general formula of $MX_{p-(q+r)}(OAr_1)_q(OAr_2)_r$, with an organomagnesium compound having a general formula of $MgX_{2-m}R_m$, wherein M represents a transition metal having an oxidation number of 4 or more, selected from Groups IV, V or VI of the Periodic table; X represents a halogen atom; Ar_1 and Ar_2 each represents substituted or unsubstituted aryl group of 6 to 30 carbon atoms, in which the Ar_1 and Ar_2 are not linked to each other; p represents the oxidation number of M of 4 or more; q and r satisfy $0 \leq q \leq p$, $0 \leq r \leq p$ and $2 \leq q+r \leq p$; R represents an alkyl group of 1 to 16 carbon atoms; and m satisfies $0<m \leq 2$.

[2] 2. The Ziegler-Natta catalyst for olefin polymerization according to claim 1, wherein the transition metal compound and the organomagnesium compound are reacted at 60-90 ℃ with a molar ratio of $0.1 \leq$ the transition metal compound/the organomagnesium compound ≤ 0.5.

[3] 3. A method for olefin polymerization, which comprises carrying out polymerization in the presence of a main catalyst which is a Ziegler-Natta catalyst produced by a method comprising a step of reacting a transition metal compound having a general formula of $MX_{p-(q+r)}(OAr_1)_q(OAr_2)_r$, with an organomagnesium compound having a general formula of $MgX_{2-m}R_m$, wherein M represents a transition metal having an oxidation number of 4 or more, selected from Groups IV, V or VI of the Periodic table; X represents a halogen atom; Ar_1 and Ar_2 each represents substituted or unsubstituted aryl group of 6 to 30 carbon atoms, in which the Ar_1 and Ar_2 are not linked to each other; p represents the oxidation number of M of 4 or more; q and r satisfy $0 \leq q \leq p$, $0 \leq r \leq p$ and $2 \leq q+r \leq p$; R represents an alkyl group of 1 to 16 carbon atoms; and m satisfies $0<m \leq 2$, and

a co-catalyst which is an alkyl aluminum compound having a general formula of $AlR_nX_{(3-n)}$, wherein R represents an alkyl group of 1 to 16 carbon atoms; X represents a halogen atom; and n satisfies $1 \leq n \leq 3$.

[4] 4. A method for olefin polymerization according to claim 3, wherein the alkyl aluminum compound is used with a molar ratio of $0.5 \leq$ the alkyl aluminum compound /the transition metal compound ≤ 500.